

POTASH

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Production of potash in the United States increased slightly compared with that of 2001 and was approximately 1.2 million metric tons (Mt) of potassium oxide (K_2O) equivalent (table 1) according to the U.S. Geological Survey (USGS), which developed domestic potash data from semiannual voluntary canvasses of U.S. operations. Of the seven operations canvassed for both semiannual surveys, six responded. Data were estimated for the nonrespondent for both surveys. Data from the responding operators were estimated to represent about 98% of the total production listed in table 1. There were five U.S. companies producing potash throughout the year from seven operations in three States. Most of the domestic production was from southeastern New Mexico, where one company operated two mines and a second company operated one mine with multiple products. The second company also operated a deep solution mine in Michigan. The third State with potash production was Utah with three companies producing from three operations.

Potash denotes a variety of mined and manufactured salts, all containing the element potassium in water-soluble form. At the end of the 19th century, potash was made from hardwood trees and was a mixture of potassium carbonate and potassium hydroxide, both of which are caustic. Lye meant sodium hydroxide, and potash lye was potassium hydroxide, a higher grade product that made a better (softer, facial) grade of soap than lye soap for laundry. Since approximately 1950, the term potash has been used to indicate potassium chloride (KCl or sylvite), potassium sulfate [K_2SO_4 or sulfate of potash (SOP), usually a manufactured product and sometimes known in Russia and China as Lemery salt], and potassium-magnesium sulfate [$K_2SO_4 \cdot 2MgSO_4$ or langbeinite or sulfate of potash magnesia (SOPM or K-Mag)]. Muriate of potash (MOP) is an agriculturally acceptable mix of KCl (95% or greater) and sodium chloride for fertilizer use that includes minor amounts of other nontoxic minerals from the mined ore and is neither the crude ore sylvinite nor pure sylvite. This publication has historically included potassium nitrate (KNO_3 , or saltpeter, or nitrate of potash, or NOP, a manufactured product) and mixed sodium-potassium nitrate ($NaNO_3 + KNO_3$ or Chilean saltpeter, a natural product) because it functions as a potassic fertilizer. Saltpeter and Chilean saltpeter are still noted in the import tables (tables 8, 9). Alunite, feldspar, and muscovite are potassium-bearing minerals that are quite insoluble in water and are considered to be neither potassic fertilizers nor ores for price-competitive potassic fertilizers.

Potash is used primarily as an agricultural fertilizer (plant nutrient) because it is a source of soluble potassium, one of the three primary plant nutrients (the others are fixed nitrogen and soluble phosphorus). Potash and phosphorus are mined products, and fixed nitrogen is produced from the atmosphere by using industrial processes. Modern agricultural practice uses large amounts of these primary nutrients plus additional nutrients, such as boron, calcium, chlorine, copper, iron, magnesium, manganese, molybdenum, sulfur, and zinc, to ensure plant health and proper maturation. The three major plant nutrients have no substitutes; low-nutrient-content alternative sources of plant nutrients, such as animal manure and guano, bone meal, compost, glauconite, and “tankage” from slaughterhouses, can be used. In addition, KCl is important in industrialized economies where it is used in oil-well drilling mud, aluminum recycling processes, in steel heat-treating, metal electroplating, snow and ice melting, and water softening, and it is used by the chlor-alkali industry to produce potassium hydroxide. The alkali potassium hydroxide is used for industrial water treatment and is the precursor of potassium carbonate, several forms of potassium phosphate, many other potassic chemicals, and in soap manufacture. The alkaline salt potassium carbonate is used in the glass for television and computer monitor tube production, alkaline batteries, food products, pharmaceutical preparations, photography, some fire extinguishers, animal feed supplements, and as a catalyst for synthetic rubber manufacture. Generally, these uses have accounted for no more than about 10% of annual consumption in the United States.

Production

Potash producers in the United States produced MOP, SOP, and SOPM. Published production data of all types and grades of potash in the United States have been adjusted since 1997 to protect the proprietary data of two producing companies. The adjustment is necessary since there is another publisher of MOP data for North America and simple subtraction of those data from all types and grades data would reveal the non-MOP data. All domestic production of SOP and SOPM, together known as sulfates, came from two companies during the year, which prevents publishing data that could reveal or allow calculation of sulfate production sales, or stocks.

The parent company of the last U.S. potassium nitrate manufacturer sought Chapter 11 protection in the spring of 2002 and NOP production was stopped. The plant's capacity was estimated to be 81,000 metric tons per year (t/yr), K_2O -equivalent (Industrial Minerals, 2002a). Reorganization was not possible, and the plant was dismantled during the year.

Domestic potash sales for 2002 increased slightly from those of 2001 as indicated by a moderate increase, less than 13%, in apparent consumption, a 17% increase in imports, and a slight increase in exports.

Mississippi Potash, Inc. (a subsidiary of Mississippi Chemical Corp.) produced MOP from two potash operations near Carlsbad, NM, known as Mississippi Potash East and Mississippi Potash West. Mississippi Potash also operated the augmented compacting facility at the former National Potash Co. mill site, known as Mississippi Potash North, to convert standard MOP to granular MOP.

IMC Potash Carlsbad Inc. started in 1940 and now includes the former Western Ag-Mineral Mine property. It also produced MOP from the Hersey, MI, solution mine.

In Utah, Reilly Industries, Inc. continued production of MOP and manure salts at its Reilly-Wendover Division's near-surface brine operation. The Moab Salt, LLC solution mine and mill continued production of MOP and halite for Intrepid Mining, LLC of Denver, CO. Compass Minerals Group, Inc. of Overland Park, KS, operated the SOP-producing plant near Ogden, UT, that used the brines of Great Salt Lake. The Ogden plant continued to produce SOP from brines of Great Salt Lake through the use of solar evaporation ponds and some beneficiation in the adjacent plant.

In Michigan, the IMC Potash Hersey solution mining operation used mechanical evaporators and crystallizers to produce white MOP. The IMC Global, Inc. annual report reported, "These lands contain an estimated 270 Mt (300 million short tons) of potash mineralization contained in two beds ranging in thickness from 4 meters (m) to 9 m (14 to 30 feet). IMC Global management estimates that these reserves are sufficient to yield 34 Mt, K₂O-equivalent of white MOP [62 million short tons, as product] from sylvinitic with an average grade of 60 percent K₂O-equivalent. At current rates of production, IMC Global management estimates that these reserves are sufficient to support operations for more than 300 years" (IMC Global, Inc., 2002, p. 4).

Consumption

The apparent consumption of potash for 2002 in the United States increased by more than 14% to about 6 Mt compared with that of 2001. In 2002, application of potash to crop land increased as a result of government assistance and favorable weather conditions in the United States.

According to Potash & Phosphate Institute data, agricultural and industrial MOP shipments from Canadian and United States producers, in decreasing order of tonnage, were to Illinois, Iowa, Ohio, Indiana, Alabama, Minnesota, and Missouri. These seven States received about 54% of agricultural and industrial MOP shipments. Agricultural MOP shipments for 2002 from Canadian and United States producers, in decreasing order of tonnage, were to Illinois, Iowa, Indiana, Ohio, Missouri, Minnesota, and Wisconsin. These seven States received about 57% of MOP shipments. The major receiving States for nonagricultural MOP shipments from Canadian and United States producers, in decreasing order, were Alabama, Ohio, Wisconsin, and Delaware. These four States received about 61% of nonagricultural MOP shipments for 2002.

Agricultural plus nonagricultural MOP shipments from U.S. producers, in decreasing order of tonnage, were to: Texas, Missouri, Michigan, California, and Illinois. These five States received about 56% of agricultural plus nonagricultural MOP shipments for 2002. The leading States for agricultural MOP shipments, in decreasing order, were Texas, Missouri, Michigan, and California. These four States consumed 55% of the domestically produced agricultural MOP. In decreasing order, Texas, New Mexico, and Colorado consumed 57% of domestically produced nonagricultural MOP.

Prices

Prices for standard and granular MOP are listed in table 5.

Foreign Trade

Based on U.S. Census Bureau data, as modified by the USGS, the exports of all types and grades of potash were essentially unchanged from 2001 at 371,000 metric tons (t), K₂O-equivalent in 2002 from about 366,000 t, K₂O-equivalent, in 2001 (table 6). Exports of MOP and SOPM increased by about 13% and 4%, respectively, from 2001. Exports of SOP declined by about 20% from 2001. Exports of NOP were reduced by 55% because the sole domestic NOP producer ceased production in the spring of 2002. Exports of MOP totaled about 55% of total potash exports; SOPM, about 24%; SOP, about 20%; and NOP, about 1%. Latin American nations received about 68% of total potash exports, while the Asian Pacific region received about 23%; the remaining 9% was distributed among African countries, European countries, Middle Eastern countries, and Canada. Countries in Latin America received about 90% of all MOP exports. MOP exports to Latin American countries were the largest single category with about 50% of total potash exports. The Asian Pacific region received about 51% of all SOP exports. SOP exports to the Asian Pacific region were the second largest category accounting for more than 10% of total exports. Latin American countries received about 40% of SOPM exports. SOPM to Latin America was less than 10% of total exports. About 42% of SOP exports was shipped to Latin America. SOP exports to Latin America were the fourth largest export category with about 9% of total exports. The Asian Pacific region received about 34% of SOPM exports, and SOPM to the Asian Pacific region accounted for about 8% of total exports. SOP to the Asian Pacific region for 2002 decreased by 43% from 2001; and SOP to Latin America increased 22% from 2001.

For the year 2002, MOP exports from the United States increased by about 13% to 204,000 t, K₂O-equivalent, from 181,000 t in 2001. MOP exports increased by 14% to Latin American countries and declined by 4% to the Asian Pacific region. The total SOP exports decreased by 20% to about 76,000 t, K₂O-equivalent, from 95,000 t, K₂O-equivalent; however, exports increased by 22% to Latin American countries. SOP exports to the Asian Pacific region fell by 53% to 39,000 t, K₂O-equivalent. Total SOPM exports increased by 4% to 90,000 t from 2001. Canadian imports of SOPM increased by 14%, Latin American imports increased by less than 4%, and Asian Pacific region imports increased by about 5%.

U.S. total potash imports in 2002 increased to 5.3 Mt, K₂O-equivalent (tables 8, 9), about 18% higher than the total imports of 2001. MOP imports from Canada increased by 17%, while imports from Belarus increased by 61% to 185,000 t, K₂O-equivalent. Imports

from Russia decreased by 44% to 110,000 t, K₂O-equivalent. SOP imports from Canada increased by 19% to 10,300 t, K₂O-equivalent, while SOP imports from Germany increased 9% to 47,000 t, as K₂O. Potassium nitrate imports from Chile increased by 75% to 34,000 t, as K₂O, while smaller NOP shipments entered the United States from China, Denmark, Germany, India, Israel, Japan, and Poland. MOP was nearly 98% of total imports, and Canada supplied about 93% of the MOP imports.

World Review

Estimated 2002 world potash production was essentially unchanged at about 26.5 Mt in 2002 (table 10). Western European production was estimated to have declined slightly; production in France, Germany and Spain declined. The estimated United Kingdom production was unchanged from 2001. The potash-producing countries of the former Soviet Union—Belarus, Russia, and Ukraine—were estimated to have increased their combined total production by 3% to 8.3 Mt, as K₂O, compared with 2001. North American production was unchanged at 9.4 Mt, as K₂O. Production in Brazil and Chile was estimated to have risen 5% to 770,000 t, as K₂O, from 2001. The potash producing countries of the Middle East—Israel and Jordan—were estimated to have increased production to about 3.1 Mt, as K₂O, for a 5% increase from the 2001 production level. The sole potash producer of the Asian Pacific region—China—was estimated to have increased production to about 430,000 t, as K₂O, 8% higher than 2001.

The world total of annual MOP productive capacity continued to be larger than the annual demand at the present [2002] price range. MOP prices were supported by two Canadian companies that reduced potash production to balance production with demand.

Forty years ago, the total world potassium nitrate production was from small, dispersed producers with a total estimated capacity of 40,500 t/yr, as K₂O (90,000 t/yr as product) (British Sulphur, 1977). These were small-scale production sites that used double decomposition technologies primarily for glass manufacture and gun powder. In the United States in 1963, the Southwest Potash Corp. manufacturing plant in Vicksburg, TN, came online with about 23,000 t/yr of capacity for industrial grade K₂O that was priced relatively low enough to also be used in the agricultural industry for cotton and tobacco. World NOP capacity had grown to about 83,000 t/yr, as K₂O, at the end of 2001 (about 1.82 Mt as product) (Industrial Minerals, 2002a). At the end of 2002, following the closure of Vicksburg Chemical Co., capacity was about 740,000 t/yr, as K₂O [1.64 million metric tons per year (Mt/yr) of product]. Some of this growth was in Israel, but more of this growth was in Chile using the caliche deposits in the low-rainfall Andes. Caliche, a natural source of nitrate ion (NO₃)⁻, is relatively low cost to mine, purify, convert to KNO₃, and ship to more than 100 countries (Fertilizer International, 2001).

Canada.—One of the three Canadian potash-mining companies, Potash Corporation of Saskatchewan (PCS), operated at 53% of its annual capacity (Potash Corporation of Saskatchewan, 2003, p. 4). The company considers its excess capacity to be 65% of global excess capacity, which would indicate a global excess capacity of 5.3 Mt/yr, as K₂O.

Chile.—PCS's wholly owned PCS Yumbres SCM, a NOP, sodium nitrate, and iodine operation in Chile, operated at near capacity early in 2002 (Fertilizer International, 2002c). Capacities were listed as 57,600 t/yr, as K₂O (128,000 t/yr of product), of NOP, 300,000 t/yr of sodium nitrate product, and 360 t/yr of iodine product. In 2002, both Norsk Hydro and PCS purchased portions of Sociedad Quimica y Minera de Chile SA stock through indirect holdings (Industrial Minerals, 2002c).

France.—In September, Mines de Potasse d'Alsace's Amélie Mine was permanently closed by smoke damage to equipment caused by a fire in a gallery that was used to store industrial waste (Industrial Minerals, 2002b). The potash operation had been expected to close in July 2003.

Germany.—A Cayman Island private equity firm, Siem Industries, purchased Deusa International, GmbH and started plans to create a medium-size industrial park at the Bleicherode Mine and refinery, while continuing to produce salts. The Bleicherode Mine commenced production in 1903 and produced from "hartzsaltz" ore until 1978 when that ore was exhausted (Deusa International, GmbH, 2002§¹). Deusa converted to solution mining carnallite. The carnallite solution was separated into MOP and magnesium chloride starting in 1988. By 2001, the firm was insolvent and for sale.

Kali und Salz GmbH divided into K + S KALI GmbH, the producer and seller of potash and magnesium products, and five other business segments (K + S AG, 2002§). Then Kali und Saltz GmbH merged with its parent company, K + S AG, which will handle the central functions of all subsidiaries. The remaining works are Bergmannsseggen-Hugo, Sigmundshall, Neuhof-Ellers, Werra, and Zielitz, all of which belong to K + S KALI GmbH.

Israel.—Israel Chemicals Ltd. completed the acquisition of Cleveland Potash Ltd. near Boulby, North Yorkshire, United Kingdom, at the beginning of May to become the fifth largest potash producer in the world with potash production capacity of 3 Mt/yr of MOP. Cleveland Potash will be a part of ICL Fertilizers [Division] (Cleveland Potash Ltd., 2002§).

Jordan.—The Government of Jordan, through Jordan Investment Corp., announced a 2-year process of privatization of Arab Potash Co. (APC) (Fertilizer International, 2002b). Along with the process of privatization was a plan to increase the production capacity to 1.44 Mt/yr, as K₂O, of MOP from 1.26 Mt/yr and the formation of three joint ventures. One joint venture will add a bromine production circuit in or near the plant, the second joint venture will be a magnesium circuit in or near the plant, and the third joint venture will be a potassium nitrate plant with byproduct dicalcium phosphate.

Russia.—JSC Uralkaly (in Berezniki, Perm Oblast) reported on its Web site that it produced nearly 4 Mt/yr, as K₂O, of MOP, employed 16,000 persons in 4 mining operations, and had begun to produce SOP (JSC Uralkaly, 2002§).

¹References that include a section mark (§) are found in the Internet References Cited section.

Spain.—The Ercros, S.A. SOP manufacturing plant (El Hondón plant) in Cartagena was closed at the end of 2001. The plant was in operation for 96 years and had a capacity of 56,000 t/yr, K₂O-equivalent. Ercros signed an agreement to distribute Tessanderlo (Belgium) SOP (Fertilizer International, 2002a).

United Kingdom.—The entire share capital of Cleveland Potash was acquired by Israel Chemicals from Anglo American plc of the United Kingdom at the beginning of May. Capacity was reported to be approximately 600,000 t/yr of MOP and 500,000 t/yr of road salt. The company employed about 860 persons.

Outlook

Apparent consumption for 2002 was 6 Mt, as K₂O, or about 12% higher than the average annual potash consumption of 5.5 Mt, as K₂O, for the past 20 years (1983-2002). U.S. potash consumption for 2003 is expected to decline slightly from 2002 owing to plans to reduce 2003 domestic grain-planting acreage because of increased plantings of foreign grain competitors (Baker, Allen, and Chambers, 2003, p. 23). This will probably result in lower potash production from domestic producers and a slight decline in potash imports.

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TABLE 1
SALIENT POTASH STATISTICS^{1,2}

(Thousand metric tons and thousand dollars unless otherwise specified)

	1998	1999	2000	2001	2002
United States:					
Production: ³					
Gross weight	3,000	2,500	2,600	2,500	2,600
Potassium oxide (K ₂ O) equivalent	1,300	1,200	1,300	1,200	1,200
Sales by producers:					
Gross weight ³	2,900	2,500	2,600	2,400	2,500
K ₂ O equivalent ³	1,300	1,200	1,200	1,100	1,200
Value ^{4,5}	330,000	280,000	290,000	260,000	280,000
Average value: ⁶					
Gross weight dollars per metric ton	\$115	\$110	\$110	\$110	\$110
K ₂ O equivalent do.	\$250	\$230	\$230	\$230	\$230
Exports:					
Gross weight	1,130	1,080	922	883	894
K ₂ O equivalent	477	459	367	366	371
Imports for consumption: ^{7,8}					
Gross weight	7,870	7,360	7,580	7,480	7,630
K ₂ O equivalent	4,780	4,470	4,600	4,540	4,620
Customs value	648,000	566,000	554,000	537,000	615,000
Consumption, apparent: ⁹					
Gross weight ¹⁰	9,700	8,700	9,400	9,000	9,200
K ₂ O equivalent ¹⁰	5,600	5,100	5,600	5,300	5,300
World, production, marketable K ₂ O equivalent	26,000 ^r	27,200 ^r	27,000 ^r	26,400 ^{c, r}	26,500

^cEstimated. ^rRevised.

¹Includes muriate and sulfate of potash, potassium magnesium sulfate, and some parent salts. Excludes other chemical compounds that contain potassium.

²Data are rounded to no more than three significant digits, unless otherwise specified, except prices.

³Data rounded to within 100,000 metric tons to avoid disclosing proprietary data.

⁴Free-on-board mine.

⁵Data are rounded to no more than two significant digits.

⁶Rounded to the nearest \$5 to avoid disclosing proprietary data.

⁷Excludes potassium chemicals and mixed fertilizers.

⁸Includes nitrate of potash.

⁹Calculated from sales plus imports minus exports.

¹⁰Data rounded to within 200,000 tons to avoid disclosing proprietary data.

TABLE 2
PRODUCTION OF CRUDE ORE IN NEW MEXICO

(Thousand metric tons)

Period	Crude salts ¹ (mine production)	
	Gross weight	Potassium oxide equivalent
2001:		
January-June ²	6,000	700
July-December ²	5,000	700
Total	11,000	1,400
2002:		
January-June ²	6,000	600
July-December ²	6,000	700
Total	12,000	1,300

¹Sylvinite and langbeinite.

²Data are rounded to no more than one significant digit.

TABLE 3
SALES OF NORTH AMERICAN MURIATE OF POTASH, BY STATE OF DESTINATION¹

(Metric tons of potassium oxide equivalent)

State	Agricultural potash		Nonagricultural potash	
	2001	2002	2001	2002
Alabama	84,700	79,600	202,000	216,000
Alaska	1,170	1,190	3,050	2,810
Arizona	2,320	2,890	3,170	3,020
Arkansas	76,400	75,100	115	35
California	59,700	74,000	10,600	11,700
Colorado	12,200	12,900	7,850	16,500
Connecticut	1,210	2,080	1,000	935
Delaware	20,600	19,400	40,800	42,400
Florida	135,000	124,000	13,600	17,200
Georgia	118,000	127,000	887	812
Hawaii	1,580	--	--	--
Idaho	32,100	44,000	808	847
Illinois	586,000	568,000	24,500	27,200
Indiana	352,000	343,000	12,400	10,500
Iowa	418,000	456,000	4,910	4,790
Kansas	24,500	33,400	9,270	9,620
Kentucky	121,000	109,000	9,210	8,700
Louisiana	68,700	63,100	7,010	6,100
Maine	3,250	3,250	348	211
Maryland	26,600	23,500	1,840	1,510
Massachusetts	1,660	1,540	9,010	9,720
Michigan	151,000	171,000	8,190	6,370
Minnesota	272,000	286,000	10,600	8,680
Mississippi	31,600	34,400	53,100	4,750
Missouri	289,000	287,000	3,930	2,040
Montana	18,500	20,500	187	187
Nebraska	55,500	56,200	2,780	1,940
Nevada	145	--	890	48
New Hampshire	222	350	266	292
New Jersey	6,580	6,530	887	961
New Mexico	7,950	12,300	31,800	23,900
New York	56,200	54,800	4,470	2,940
North Carolina	118,000	123,000	188	300
North Dakota	30,000	31,500	38	37
Ohio	335,000	313,000	93,000	100,000
Oklahoma	18,000	26,300	5,060	5,790
Oregon	32,500	37,900	771	378
Pennsylvania	48,200	50,200	12,800	9,700
Rhode Island	--	--	35	86
South Carolina	55,600	58,800	190	72
South Dakota	21,200	21,100	526	399
Tennessee	135,000	124,000	11,600	7,680
Texas	106,000	116,000	34,700	37,200
Utah	4,210	2,540	11,600	18,800
Vermont	2,390	2,280	60	47
Virginia	72,900	77,700	24	616
Washington	38,300	45,000	1,600	1,360
West Virginia	2,670	4,010	1,110	987
Wisconsin	211,000	204,000	84,600	65,900
Wyoming	1,780	2,290	9,090	5,990
Total	4,270,000	4,330,000	746,000	698,000

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

Source: Potash & Phosphate Institute.

TABLE 4
SALES OF NORTH AMERICAN MURIATE
OF POTASH TO U.S. CUSTOMERS, BY GRADE¹

(Thousand metric tons of potassium oxide equivalent)

Grade	2001	2002
Agricultural:		
Standard	174	160
Coarse	2,070	2,150
Granular	1,610	1,630
Soluble	406	396
Total	4,270	4,330
Nonagricultural:		
Soluble	142	157
Other	605	541
Total	746	698
Grand total	5,010	5,030

¹Data are rounded to no more than three significant digits; may not add to totals shown.

Source: Potash & Phosphate Institute.

TABLE 5
PRICES OF U.S. POTASH, BY TYPE AND GRADE^{1, 2}

[Dollars per metric ton of potassium oxide (K₂O) equivalent]

Type and grade	2001		2002	
	January- June	July- December	January- June	July- December
Muriate, 60% K ₂ O minimum:				
Standard	165	165	160	150
Granular	160	150	150	155

¹Average prices, free on board mine, based on sales.

²Data rounded to nearest \$5.

TABLE 6
U.S. EXPORTS OF POTASH, BY TYPE¹

	Approximate average potassium oxide (K ₂ O)- equivalent content (percentage)	Quantity (metric tons)	
		Product	K ₂ O equivalent ^c
2001:			
Potassium chloride, all grades	61	296,000	181,000
Potassium sulfate	51	186,000	94,800
Potassium magnesium sulfate	22	391,000	86,000
Potassium nitrate	45	10,200	4,590
Total	XX	883,000	366,000
2002:			
Potassium chloride, all grades	61	334,000	204,000
Potassium sulfate	51	148,000	75,700
Potassium magnesium sulfate	22	407,000	89,500
Potassium nitrate	45	4,600	2,070
Total	XX	894,000	371,000

^cEstimated. XX Not applicable.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau, adjusted by the U.S. Geological Survey.

TABLE 7
U.S. EXPORTS OF POTASH, BY COUNTRY¹

(Metric tons of product)

Country	Potassium chloride		Potassium sulfate, all grades ²		Potassium nitrate		Total	
	2001	2002	2001	2002	2001	2002	2001	2002
Argentina	424	6	6,120	21	--	--	6,550	27
Australia	--	--	18,800	18,800	1	1	18,800	18,800
Barbados	1,100	620	65	201	8	--	1,170	821
Belgium	--	2	78	556	--	--	78	558
Belize	799	2,030	17	--	--	--	816	2,030
Brazil	46,300	48,900	5	268	32	35	46,400	49,300
Canada	4,920	6,810	76,700	94,200	7,140	2,760	88,800	104,000
Chile	20,200	51	32,700	22,000	--	--	52,900	22,000
China	--	--	88,000	41,600	--	--	88,000	41,600
Colombia	10,000	24,600	27,100	33,200	--	5	37,100	57,900
Costa Rica	4,030	14,200	27,900	27,300	--	--	31,900	41,500
Cote d'Ivoire	--	--	9,750	17,800	--	--	9,750	17,800
Dominican Republic	37,700	15,000	5,260	3,450	89	145	43,100	18,600
Ecuador	7,150	3,000	9,290	2,220	136	--	16,600	5,220
France	39	45	15,400	2,900	--	--	15,500	2,940
Guadeloupe	3,300	2,560	1,300	1,000	--	--	4,600	3,560
Guatemala	1,550	22	--	--	--	--	1,550	22
Guyana	4,210	4,600	--	--	--	--	4,210	4,600
Honduras	5,000	6,050	1,200	2,580	--	--	6,200	8,630
Jamaica	5,800	5,040	--	15	--	24	5,800	5,080
Japan	25,900	24,600	133,000	120,000	24	--	159,000	145,000
Korea, Republic of	--	--	14,800	15,200	169	2	15,000	15,200
Malaysia	--	--	997	10,700	1,030	262	2,030	11,000
Martinique	10,800	6,860	3,890	2,630	--	--	14,700	9,490
Mexico	83,000	133,000	53,100	78,800	1,510	1,190	138,000	213,000
Netherlands	11	35	93	1,450	--	--	104	1,480
New Zealand	--	--	1,540	5,790	--	--	1,540	5,790
Nicaragua	--	2,750	--	--	--	--	0	2,750
Panama	2,210	7,460	442	759	--	--	2,650	8,220
Peru	930	--	9,220	21,900	--	--	10,100	21,900
South Africa	--	--	322	2,100	--	--	322	2,100
Thailand	--	--	3,450	--	--	--	3,450	--
Venezuela	13,600	24,800	28,700	26,900	--	--	42,300	51,700
Other	7,200 ^r	664	7,410 ^r	545	56 ^r	172	14,700	1,380
Total	296,000	334,000	577,000	555,000	10,200	4,600	883,000	894,000

^rRevised. -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes potassium magnesium sulfate.

Source: U.S. Census Bureau, adjusted by the U.S. Geological Survey.

TABLE 8
U.S. IMPORTS FOR CONSUMPTION OF POTASH, BY TYPE¹

	Approximate average potassium oxide (K ₂ O)- equivalent content (percentage)	Quantity (metric tons)		Value (thousands)	
		Product	K ₂ O	Customs	C.i.f. ²
			equivalent ^c		
2001:					
Potassium chloride ³	61	7,300,000	4,450,000	\$500,000	\$527,000
Potassium sulfate	51	113,000	57,800	21,000	23,000
Potassium nitrate	45	50,800	22,900	13,000	14,900
Potassium sodium nitrate mixture	14	15,400	2,160	2,620	2,920
Total	XX	7,480,000	4,540,000	537,000	568,000
2002:					
Potassium chloride ³	61	7,380,000	4,500,000	559,000	590,000
Potassium sulfate	51	132,000	67,500	23,800	26,500
Potassium nitrate	45	101,000	45,300	27,900	31,800
Potassium sodium nitrate mixture	14	16,400	2,300	4,490	4,820
Total	XX	7,630,000	4,620,000	615,000	653,000

^eEstimated. XX Not applicable.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Cost, insurance, and freight.

³Contains imports listed under Harmonized Tariff Schedule of the United States code 3104.10.0000.

Source: U.S. Census Bureau, adjusted by the U.S. Geological Survey.

TABLE 9
U.S. IMPORTS FOR CONSUMPTION OF POTASH, BY COUNTRY¹

Country	Potassium chloride (metric tons)		Potassium sulfate (metric tons)		Potassium nitrate (metric tons)		Potassium sodium nitrate (metric tons)	
	2001	2002	2001	2002	2001	2002	2001	2002
Belarus	191,000	309,000	--	--	--	--	--	--
Belgium	--	--	8	10,400	--	20	--	--
Bulgaria	--	--	--	--	--	--	--	--
Canada	6,770,000	6,810,000	17,000	20,200	33	39	188	500
Chile	--	150	11,300	9,120	43,100	75,600	15,200	15,900
China	25	22	--	--	110	225	--	--
Denmark	--	--	--	6	2,500	5,970	--	--
France	--	--	124	92	--	158	--	--
Germany	1,080	5,430	84,100	92,000	1,050	2,010	12	--
India	50	--	50	237	115	2	--	--
Israel	20	71,800	--	--	2,990	15,800	--	--
Japan	332	--	711	247	731	746	--	--
Lithuania	9,710	--	--	--	--	--	--	--
Poland	--	--	--	--	113	132	--	--
Russia	329,000	184,000	--	--	--	--	--	--
United Kingdom	169	74	--	--	2	--	--	--
Other ²	21	--	1	5	2	14	6	17
Total	7,300,000	7,380,000	113,000	132,000	50,800	101,000	15,400	16,400

	Total					
	Quantity (metric tons)		Value (thousands)			
	2001	2002	Customs		C.i.f. ³	
			2001	2002	2001	2002
Belarus	191,000	309,000	\$15,500	\$25,400	\$17,200	\$28,100
Belgium	8	10,400	4	1,680	5	1,770
Bulgaria	--	--	--	--	--	--
Canada	6,790,000	6,830,000	460,000	517,000	482,000	543,000
Chile	69,700	101,000	14,800	23,600	16,600	26,200
China	135	247	90	146	100	162
Denmark	2,500	5,970	812	2,110	1,100	2,810
France	124	250	31	156	38	181
Germany	86,300	99,400	15,400	17,200	16,800	19,300
India	215	239	101	19	107	22
Israel	3,010	87,600	791	12,500	1,090	14,500
Japan	1,770	993	735	508	829	565
Lithuania	9,710	--	811	--	939	--
Poland	113	132	63	64	72	76
Russia	329,000	184,000	27,900	14,800	30,900	16,600
United Kingdom	171	74	105	91	118	99
Other ²	30	36	27	51	32	56
Total	7,480,000	7,630,000	537,000	615,000	568,000	653,000

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Potassium chloride includes Switzerland (2001); potassium sulfate includes Mexico (2002) and Switzerland (2001); potassium nitrate includes Hong Kong (2002); and potassium sodium nitrate includes the Netherlands.

³Cost, insurance, and freight.

Source: U.S. Census Bureau, adjusted by the U.S. Geological Survey.

TABLE 10
MARKETABLE POTASH: WORLD PRODUCTION, BY COUNTRY^{1,2}

(Thousand tons of potassium oxide equivalent)

Country	1998	1999	2000	2001 ^c	2002 ^c
Belarus	3,451	4,553	3,786	3,700	3,800
Brazil	326	348	352	352	352
Canada	9,201	8,475	9,202 ^r	8,224 ^{r, 3}	8,200
Chile	280 ^r	312 ^r	330 ^r	390 ^r	350
China ^c	120	260	380	385	450
France	453	345	320 ^r	244 ^r	130
Germany	3,582	3,543	3,407	3,550	3,450
Israel	1,668	1,702	1,747	1,774 ³	1,930
Jordan	916	1,080	1,160	1,177 ³	1,200
Russia ^c	3,500	4,200	3,700	4,300	4,400
Spain ^c	597	656	653 ³	471 ^r	407
Ukraine ^c	35	50 ^r	85 ^r	75 ^r	60
United Kingdom ^c	608	495	600 ^r	532 ^r	540
United States ⁴	1,300	1,200	1,300	1,200	1,200
Total	26,000 ^r	27,200 ^r	27,000 ^r	26,400 ^r	26,500

^cEstimated. ^rRevised.

¹World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Table includes data available through April 24, 2003.

³Reported figure.

⁴Rounded to within 100,000 metric tons to avoid disclosing proprietary data.